Macomb County
Potential Conservation/Natural Areas Report

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MNFI maintains a continuously updated information base, the only comprehensive, single source of data on Michigan's endangered, threatened, or special concern plant and animal species, natural communities, and other natural features. MNFI has responsibility for inventorying and tracking the State's rarest species and exceptional examples of the whole array of natural communities. MNFI also provides information to resource managers for many types of permit applications regarding these elements of diversity.

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Macomb County Potential Conservation/Natural Areas

Introduction

Natural resource conservation is a fundamental component of a community's long-term environmental and economic health. Natural areas perform important functions such as water filtration and they provide recreational opportunities and wildlife habitat that enhance the overall vitality of a community. Abundant natural resources once surrounded early settlements in Macomb County. Now, much reduced in size, natural resource areas are becoming encircled by populations. These remaining sites are the foundation of Macomb County's natural heritage; they represent the last remaining remnants of Macomb County's native ecosystems, natural plant communities and scenic qualities. Consequently, it is in Macomb County's best interest and to a community's advantage that these sites be carefully integrated into the planning for future development. Striking a balance between development and natural resource conservation and preservation is critical if Macomb County is to maintain its unique natural heritage. This approach will provide the greatest opportunity to maintain high property values and continued market demand. Part of what makes Macomb County such a unique and desirable place to work, live, and play is the combination, quality, and accessibility of its natural landscapes, lakes, rivers, and streams.

This report identifies and ranks Potential Conservation Areas remaining in Macomb County. Potential Conservation Areas are defined as places on the landscape dominated by native vegetation that have various levels of potential for harboring high quality natural areas and unique natural features. In addition these areas may provide critical ecological services such as maintaining water quality and quantity, soil development and stabilization, pollination of cropland, wildlife travel corridors, stopover sites for migratory birds, sources of genetic diversity, and floodwater retention. However, the actual ecological value of these areas can only be truly ascertained through on the ground biological surveys. The process established by the Michigan Natural Features Inventory (MNFI) of identifying potential conservation areas, can also be used to update and track the status of these remaining sites. The Michigan Natural Features Inventory recommends that Macomb County Planning & Economic Development Department (PEDD) incorporate this information into their comprehensive natural area mapping services. The site map and ranking data can be used by local municipalities, land trusts, and other agencies to prioritize conservation efforts and assist in finding opportunities to establish an open space system of linked natural areas throughout Macomb County.

This project was a multi-jurisdictional, community based, public/private partnership, which demonstrates how to comprehensively identify and prioritize natural resources and critical ecosystems and identifies tools for the protection and sustainability of these resources. A systematic process was developed in order to identify and prioritize potential natural areas for preservation and/or further field survey efforts. Over 300 potential conservation areas were identified and ranked. These sites represent what appears to be the least disturbed natural areas remaining within Macomb County.

When using this information it is important to keep in mind that site boundaries and ranking are a starting point and tend to be somewhat general in nature. Consequently, each community, group or individual using this information should determine what additional expertise is needed in order to establish more exact boundaries and the most appropriate conservation actions.

Process for delineating and ranking of Potential Conservation/Natural Areas within Macomb County

Interpretation of the 15-geographic township area in Macomb County was conducted by using digital aerial photography taken in 2003 and provided by Macomb County's Planning and Economic Development Department. As the townships were methodically interpreted and digitized using this imagery, the same areas were examined using:

- Southeast Michigan Council of Governments (SEMCOG) 2000 digital landcover.
- Wetlands Map
- Macomb County Major and Minor Roads
- Macomb County Streams Coverage

These additional data sources were used to enhance and corroborate the interpretation process.

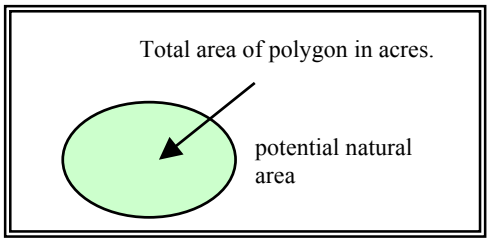
Delineation of sites was done through aerial photo interpretation, with emphasis placed on 1) intactness, 2) wetlands and wetland complexes, 3) riparian corridors, and 4) forested tracts. Delineation of sites during this phase of the process was done conservatively, such that the chance of capturing sites that may end up being eliminated upon closer inspection, was greater than the chance of omitting sites that should have been delineated. Sites were delineated by focusing on wetlands and forest tracts and eliminating as much development (including roads), active agriculture and old fields as possible. Boundaries typically were defined by hard edges such as roads, parking lots, developments, and railroad beds. All potential natural areas were identified and delineated regardless of size. Municipal boundaries were not utilized to delineate site boundaries unless the boundary corresponded to a defined hard edge, such as a road. Once all sites were delineated, sites that were of small acreages were deleted.

Site Selection and Prioritization

Following the aerial photo interpretation and the delineation of potential natural areas, a more rigorous level of examination was undertaken based upon specific scaled criteria to prioritize sites. Scaled criteria were developed that reflected the characteristics that were used to first delineate the sites. The criteria used to first delineate the sites were translated to a numerical scale. Each site could then be assessed based upon the scaled criteria and a total score calculated, based upon the sum of the scores for each criterion.

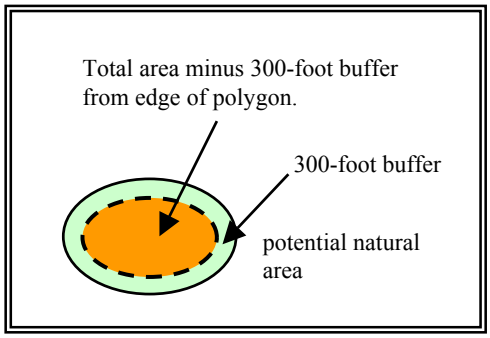
Description of Criteria

Size - The total size of a site is recognized as an important factor for viability of species and ecosystem health. Larger sites tend to have higher species diversity, higher reproductive success, and improve the chances of plant and animal species surviving a catastrophic event such as a fire, tornado, ice storm, or flood.



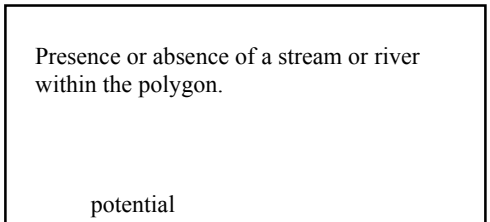
Size is defined as the total area of the polygon.

Core Area - Many studies have shown that there are negative impacts associated with the perimeter of a site on "edge-sensitive" animal species, particularly amphibians, reptiles, and forest and grassland songbirds. Buffers vary by species, community type, and location, however most studies recommend a buffer somewhere between 200 and 600 ft. to minimize negative impacts. Three hundred feet is considered a sufficient buffer for most "edge-sensitive" species in forested landscapes.



For this project, core area is defined as "size" (see above) minus a 300-foot wide buffer measured inward from the edge of the polygon. Core area is different from total area of the site because it takes into account the shape of the site. Typically, round shapes contain a larger core area relative to the total site than long narrow shapes.

Stream Corridor - Water is essential for life. Streams are also dynamic systems that interact

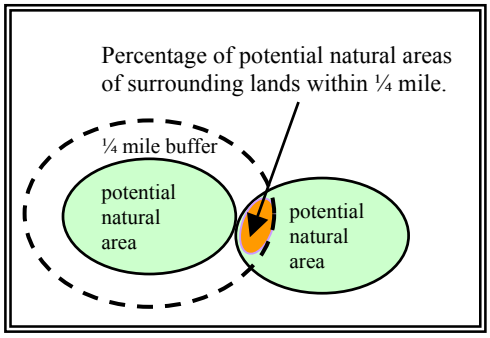


with the surrounding terrestrial landscape creating new habitats. Waterways also provide the added benefit of a travel corridor for wildlife, connecting isolated patches of natural vegetation.

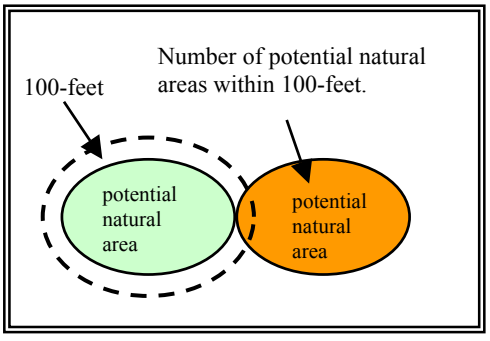
Sites that are part of riparian corridors were given a score of 2 or 0 points depending upon whether or not the site included a portion of a river or stream system. Macomb County GIS hydrography data layer was used to determine presence/absence of river or stream.

Landscape Connectivity - Connectivity between habitat patches is considered a critical factor for wildlife health. High connectivity improves gene flow between populations, allows species to recolonize unoccupied habitat, improves resilience of the ecosystem, and allows ecological processes, such as flooding, fire, and pollination to occur at a more natural rate and scale. Landscape connectivity was measured in two ways, *percentage* and *proximity*.

Percentage
Landscape connectivity was measured by building a ¼ mile buffer around each polygon and measuring the percentage of area that falls within other potential natural areas.

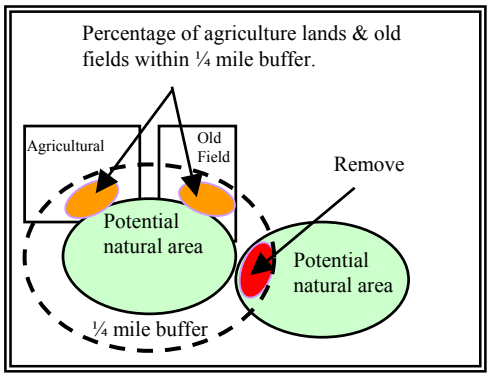


Proximity
In addition to measuring the area around a polygon that is considered natural, connectivity can also be measured by the number of individual potential natural areas in close proximity to the site. The greater the number of polygons in "close proximity," the higher the probability for good connectivity. Close proximity was determined to be 100 feet. One hundred feet was chosen as the threshold based on digitizing error and typical width of transportation right-of-ways, pipelines, and powerline corridors.



Restorability of surrounding lands- Restorability is important for increasing the size of existing natural communities, providing linkages

to other habitat patches, and providing a natural buffer from development and human activities.



Restorability is measured by the potential for restoration activities in areas adjacent to the delineated site. First, a ¼ mile buffer was built around each site. Potential natural areas as defined by MNFI, located within the buffer area were then removed, and the percentage of agricultural land and old fields within the remaining buffer area was measured. Only agricultural land and old fields were considered because they require the least amount of effort to restore back to some sort of natural condition. 1995 SEMCOG landcover data was used to identify areas of agricultural land and old fields.

Parcel Fragmentation – Ownership patterns can have a tremendous impact on the long-term conservation success of the project. Sites that contain numerous small parcels are typically much more difficult to manage and protect than sites with a few large parcels.

Parcel fragmentation was determined by the median size of parcels to eliminate the influence of a few small or large parcels.

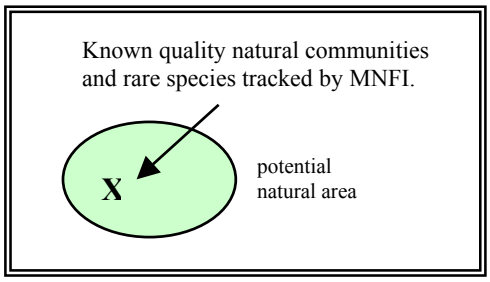
Vegetation Quality – The quality of vegetation is very critical to determining the quality of a natural area. Vegetation can reflect past disturbance, external impacts, soil texture, moisture gradient, aspect, and geology. Vegetative quality however is very difficult to measure without recent field information. As a surrogate to field surveys, we decided to utilize the circa 1800 vegetation datalayer. The 2000 landcover was compared to the circa 1800 vegetation and a vegetation change map was developed.

Percentage
Vegetation quality was measured by calculating the percentage of the site that contains potentially unchanged vegetation. This allows small sites with a high percentage of potentially unchanged vegetation to score points.

Area

Vegetation quality was also measured by calculating the area of potentially unchanged vegetation that falls within each site. This balances the bias of small sites with high percentage of potentially unchanged vegetation by awarding points based on actual area covered.

Number of Element Occurrences - The location of quality natural communities and rare species tracked by MNFI are often, although not always, indicative of the quality of a site. While not indicative of site quality, the occurrences in and of themselves are important.



Three points were awarded to sites that had three or more element occurrences (EOs), two points for 2 EOs, one point for 1 EO, and zero points if there were no EOs. Since Macomb County has never received a comprehensive natural features site field inventory, two total scores were calculated, one with element occurrence scores and one without. Excluding the element occurrence criteria from the matrix eliminates survey bias towards public lands and complications associated with the variability of the last observed date amongst element occurrences.

Note: The number of points assigned for each criteria is shown in the *site criteria table* located on page 10.

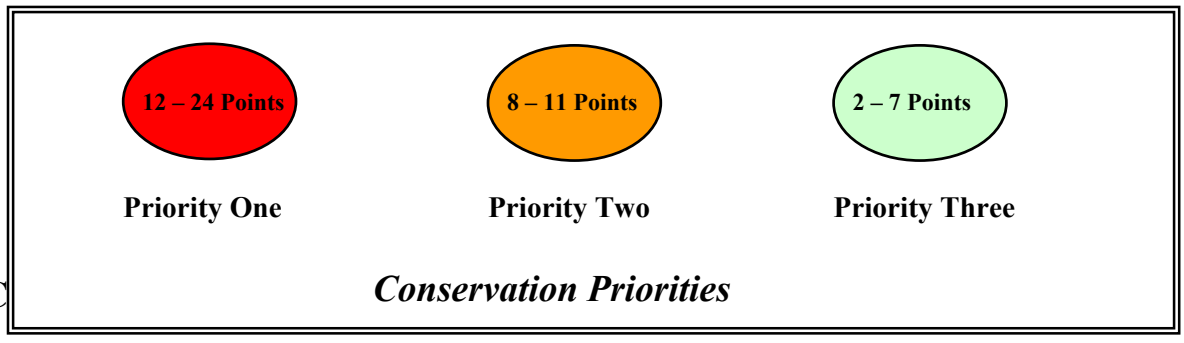
High, Medium, & Low Ranking

A total of 359 sites, totaling 23,560 acres were identified as potential conservation areas. This represents only 7.6% of the county. Each of the 359 delineated sites was given a total score based upon the criteria described in the following table. With the element occurrences included in the criteria, total scores ranged from a high of 24 points (out of a possible 40 points) to a low of 2 points. The mean score was 8, while the median score was 7. The site that scored the highest (located along the Clinton River in the southwest corner of Shelby Township) was 572 acres in total size, with a core size of 304 acres. Once the total scores were tabulated, the next step was to determine a logical and reasonable break between high priority, medium priority, and low priority sites. Many potential natural area sites can be just one point away from being placed into another category.

Natural break and equal interval classification are two legitimate methods for classifying sites. Equal interval classification, as defined for this project, is based on absolute values. It shows the value of each site relative to the highest (40) and lowest (1) possible values. Equal interval classification breaks all possible scores into equal classes regardless of actual scores. This eliminates the relative nature of scores when sites are compared only to other sites within a given area.

The natural break method is the default classification method in ArcView. This method identifies breakpoints between classes using a statistical formula called Jenk's optimization. The Jenk's method finds groupings and patterns inherent in the data by minimizing the sum of the variance within each of the classes. Based on the results of each method, MNFI recommends using the natural break method for Macomb County. This is due to the fact that 83% of the total acres and 93% of the sites fell into the priority three category using the equal interval system.

As a result of applying the natural break method, a total of 171 sites were placed in the low priority category, 132 sites were placed in the medium category, and 56 sites were placed in the high priority category. Breaking it down into percentages of total sites identified, 48% were labeled low priority, 37% were labeled medium priority, and 15% of the sites were identified as high priority. Breaking it down by acreage, 34% (8,098 acres) fell into the low quality category, 39% (9,192 acres) fell into the medium quality category, and 27% (6,360 acres) fell into the high priority category.

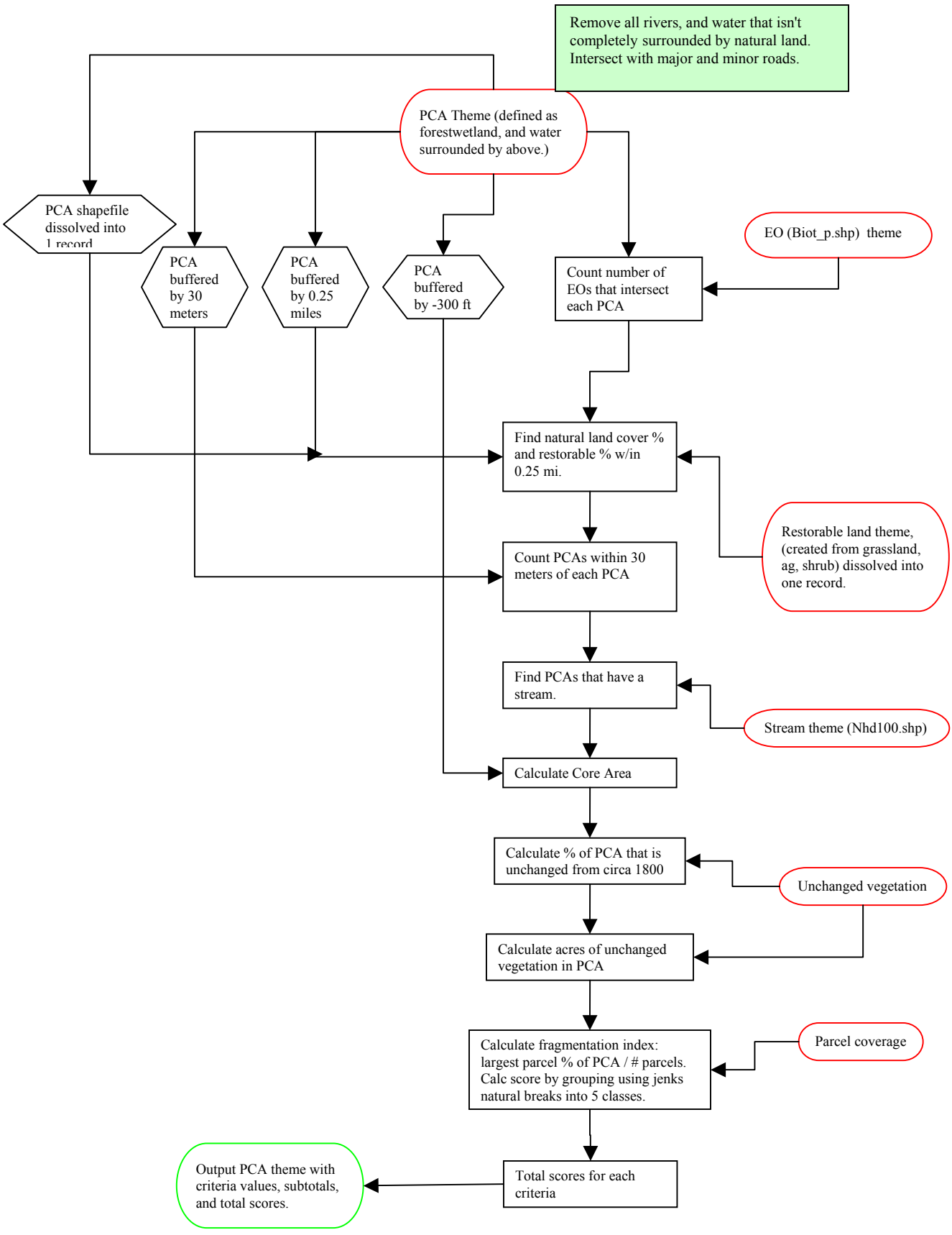


Site C

CRITERIA	*DESCRIPTION*	*DETAIL*	*PTS*
Total Size	Total size of the polygon in acres. ❑ *Size is recognized as an important factor for viability of species and ecosystems.*	20 - 40 ac.	0
		>40 - 80 ac.	1
		>80 - 240 ac.	2
		>240 ac.	4
Size of Core area	Acres of core area. - Defined as total area minus 300 ft. buffer from edge of polygon. ❑ *The core area is essential in order to limit negative impacts on "edge-sensitive" animal species.*	0 - 60ac	0
		>60 - 120 ac	2
		>120 - 230 ac	4
		>230 ac	8
Stream Corridor (presence/absence)	Presence/absence of a stream or river within the polygon. ❑ *Stream corridors provide wildlife connections between patches of habitat.*	none	0
		present	2
Landscape Connectivity Percentage	Percentage of potential natural areas of surrounding lands within 1/4 mile. - build 1/4 mile buffer - measure % of buffer that is a potential natural area	0 - 11%	0
		>11 - 22%	2
		>22 - 33%	3
		>33%	4
Proximity	Number of potential natural areas within (100 ft.). ❑ *Connectivity between habitat patches is considered a critical factor for wildlife health.*	0	0
		1	1
		2	2
		3	3
		4+	4
Restorability of surrounding lands	Restorability of surrounding lands within 1/4 mi. - build 1/4 mile buffer - subtract potential natural areas from buffer - measure % agricultural lands and old fields ❑ *Restorability is important for increasing size of existing natural communities, providing linkages to other habitat patches, and providing a natural buffer from development.*	0 - 35%	1
		>35 - 65%	2
		>65%	3
Vegetation Quality Percentage	Estimates the quality of vegetation based on circa 1800 vegetation maps and 2000 IFMAP landcover data. Measures the percentage of potentially unchanged vegetation within a polygon.		0
			1
			2
			4
Area	Measures the actual area within a polygon of potentially unchanged vegetation regardless of the size of the polygon.		0
			1
			2
			4

Parcel Fragmentation	Measures the feasibility of conservation for a site by analyzing parcel numbers and size. It is calculated by dividing the percent area of the largest parcel in the site by the total number of parcels.		0
			1
			2
			4
Number of Element Occurrences (EOs)	Known element occurrences increase the significance of a site. ❑ *The location of quality natural communities and rare species tracked by MNFI are often, although not always, indicative of the quality of a site.*	0	0
		1	1
		2	2
		3+	3
Note	Total possible points = 37 without EOs		
	Total possible points = 40 with EOs		

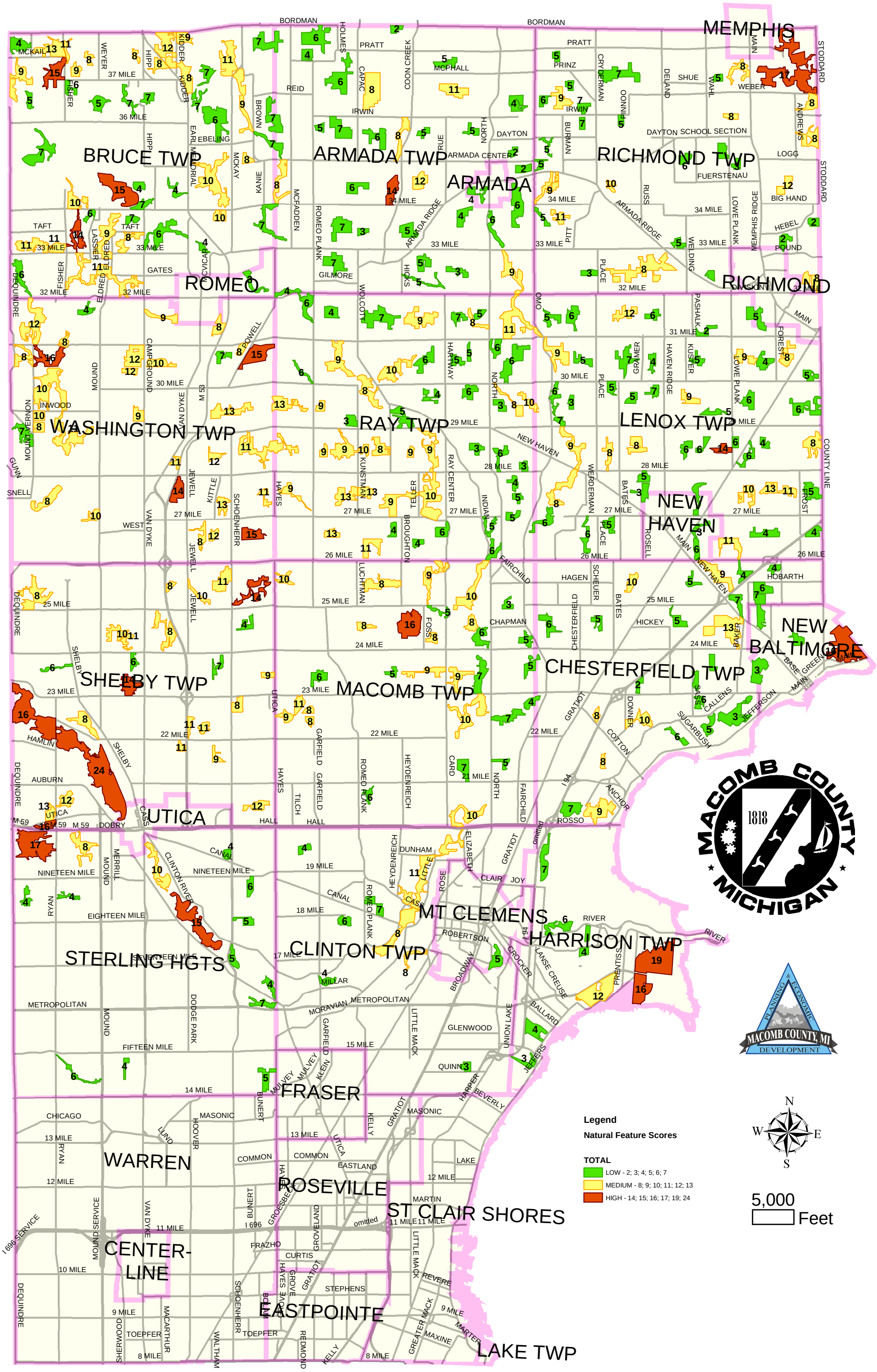
Flow chart for PCA model process



PCA Map

Michigan Natural Features Inventory Map

Macomb County, Michigan



Conclusion

This inventory documents that Macomb County has several high quality natural areas that still look and function the way they did 200 years ago. Of the remaining high quality sites, some have the potential of harboring endangered, threatened, or special concern animal and plant species. With the high rate of development and its associated stresses on the natural environment, conservation of these remaining areas and their native plant and animal populations are vital if the County's diverse natural heritage is to be conserved.

Comments/Recommendations

1) All identified sites, regardless of their ranking, have significance to their local setting. This is especially true in areas that have experienced a high degree of development and landscape fragmentation.

2) Macomb County Department of Planning & Economic Development should incorporate funding into the annual budget in order to update mapping and assessment of County potential natural areas.

3) Efforts to conserve potential natural areas should include on-going site assessment and monitoring.

4) Macomb County Department of Planning and Economic Development should undertake widespread distribution of this survey in order to build awareness and encourage long-term resource planning and stewardship. Knowledge of potential natural areas is meaningless unless action is taken to ensure that they will remain part of the County's natural heritage.

5) Local municipalities should identify opportunities to link other possible natural resource sites not mapped during this survey. This would include small patches of land, tree and fence row plantings, agriculture land, and open fields.

6) Field inventories should be conducted on identified potential conservation areas, particularly priority one sites. This fieldwork would provide much needed additional site-specific data that should be considered when developing in and around such areas.

7) Recent scientific studies have found a direct relationship between natural area protection and long-term water quality. Considering the potential impact on the economy associated with degradation of Lake St. Clair and the other water resources found in Macomb County, this direct link should not be overlooked. Protecting a natural area protects the water resources in the area as well.

8) Municipalities should consider adopting a green infrastructure plan. The conservation of

potential natural areas is most effective, and successful, in the context of an overall plan that incorporates natural areas, working landscapes, and recreation opportunities.

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